



Reproducibility Report: Reimagining Logistics and Connectivity from Space: Artificial Intelligence and Satellite Imagery Applications

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This review verifies the reproducibility of the exhibits included in the report “*Reimagining Logistics and Connectivity from Space: Artificial Intelligence and Satellite Imagery Applications*”.

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Main findings

- **All data exhibits in the report were reproduced, with three qualifications.** Figure 4 was reconstructed from the published report rather than rerun from its original inputs. Figures 3, 8 and 13 include manual edits.
- The code was successfully executed on a new computer after:
 1. **Obtaining the data.** Public data is included in the package. Restricted data must be requested from the data providers (see the README and the Datasets section of the catalog entry) and placed under the paths listed in *data_hash_report.csv*. Use the SHA-256 hashes in that file to confirm that the files match those used in the verification.
 2. **Setting the directory.** Open *main.py* and set the top-level directory of the package.
 3. **Running the code.** Run *python main.py*. It runs the code for each exhibit folder and writes the tables and figures to that folder’s outputs.

Figure 8 is not generated by *main.py*: it was produced manually in ArcGIS Pro, and the ArcGIS project is not included in the package.

- The output demonstrates consistent stability across multiple runs. Executing the code 2 times consecutively yielded identical results.
- The code takes approximately 1 hour to run.
- We conducted our reproducibility analysis based on the report shared by the authors on September 21st, 2026.

- **Verification Process and Data Handling:**

- *data_hash_report.csv* lists the SHA256 hashes of all files in the Data folder to support data integrity checks. Users who acquire restricted data can use this file to verify that the data has not been altered.
- Most exhibits were verified using restricted data provided directly by the authors. This verification is distinct from what a reader can rerun with the public package alone; Section lists which exhibits can be rerun publicly.

- **Reproducibility Summary:**

- **Data:** Some data is restricted and has not been included in the reproducibility package. This includes commercial satellite imagery (PlanetScope, Pléiades) and data derived from it, administrative truck-parking data from the Georgian Revenue Service, confidential Aktau terminal throughput data, and the Korea warehouse training labels. For more details, please refer to the README file.
- **Code:** All code from the processed inputs to the exhibits is included in the reproducibility package. The package starts from processed Sentinel-1 occupancy estimates; the upstream processing of raw Sentinel-1 scenes is not included.
- **Outputs:** All outputs except Figure 8 are generated by code included in the reproducibility package. Figure 8 was produced manually in ArcGIS Pro, and Figure 4 is generated from values digitized from the published report.
- **Reproducibility verification:** Reviewers used data provided directly by the authors to conduct the reproducibility verification, and not all of it is included in the public reproducibility package. The reviewers did not verify if publicly available data matches the data provided by the authors.
- **Dependencies environment:** The reviewers reproduced an existing environment for dependencies using dependency files or an environment metadata file provided by the authors.

List of exhibits and reproducibility status

Results in the Main Section of the Report

- **Table 1** Does not apply
- **Table 2** Does not apply
- **Figure 1** Reproduced. Verified against Figure1_Georgia_TIR_Sarpi_report_style.
- **Figure 2** Reproduced. Verified against figure2_top_timeseries_report_style.
- **Figure 3** Reproduced with manual edits. Verified against figure3_reproducible_replacement_2018_2023. The input workbook (Figure3.xlsx) also contains PlanetScope-derived detections and Crickmay GPS data and is not included in the public package.
- **Figure 4** Reverse-engineered by the team. Verified against figure4_reverse_engineered_reconstruction. The original inputs (Figure4.xls, the area of interest and the Sentinel-1 scene list) were not part of the

materials received, so the figure is reconstructed from values digitized from the published report and cannot be rerun from the original source data. A historical Figure4.xls (482 dated occupancy observations, 2 March 2015 to 16 March 2024) was recovered later, but its area of interest, scene list and aggregation to the published curve have not been verified.

- **Figure 5** Does not apply
- **Table 3 Reproduced.** Verified against table3_reproducible_rerun.
- **Figure 6 Reproduced.** Verified against figure6_static_map_reproduced.
- **Table 4 Reproduced.** Verified against table4_final_validation.
- **Figure 7 Reproduced.** Verified against figure7_plot_data.csv and the current artwork. The building counts in the threshold subset (288, 323, 392, 450, 529 and 567 for thresholds <1990 to <2015) were independently recounted from the 704 delivered buildings. These counts describe currently mapped buildings grouped by WSF settlement-appearance year, not historical warehouse inventories.
- **Figure 8 Reproduced with manual edits.** Figure produced in ArcGIS Pro.
- **Figure 9** Does not apply

Results in the Annex

- **Figure 10 Reproduced.** Verified against figure10_chicago_clearing_reproducible.png.
- **Figure 11 Reproduced.** Verified against figure11_aktau_indexed_public_replacement.png.
- **Figure 12 Reproduced.** Verified against figure12_python_static_reproduction.png.
- **Figure 13 Reproduced with manual edits.**
- **Figure 14 Reproduced.** Verified against figure14_reproduced_report_style.png.
- **Figure 15** Does not apply
- **Table 5** Does not apply
- **Table 6** Does not apply
- **Table 7 Reproduced.** Verified against table7_validation_against_report.csv.
- **Table 8: Panel A Reproduced.** Verified against table8_panelA_direct_rerun_metrics.csv. Both models have 75 true negatives, 0 false positives, 1 false negative and 14 true positives across 90 test records, giving an accuracy of 98.89%, as reported. The value 97.77 appears only in the archived table8_panelA_report_values.csv which the report does not use.
- **Table 8: Panel B Reproduced.** Verified against table8_feature_importance_direct_rerun.csv.
- **Figure 16** Does not apply

Reproducibility with the public package

The verification above used data provided directly by the authors. With only the files in the public package, a reader can rerun the following exhibits:

- **Can be rerun with public files:** Figures 4, 7 and 10 and Table 4. Figure 4 reruns as a reconstruction from the published report, not from original Sentinel-1 inputs.
- **Require restricted data:**
 - Figures 1 and 14: Georgian Revenue Service truck-parking data.
 - Figure 3: input workbook with PlanetScope-derived detections and Crickmay GPS data.
 - Figures 2, 12 and 13: PlanetScope imagery and data derived from it.
 - Figure 6 and Table 8: Pléiades imagery, digitized truck points and the Incheon building tables derived from them.
 - Figure 11: confidential Aktau terminal throughput data and the indexed series derived from it.
 - Tables 3 and 7 (Korea results): Korea warehouse training labels.
 - Figure 8: produced manually in ArcGIS Pro; the ArcGIS project is not included.

Reproduction Environment

Paper exhibits were reproduced on a computer with the following specifications:

- OS: macOS
- Processor: Apple M4 Pro
- Memory available: 24 GB
- Software version: Python 3.14.6